

WHAT IS CLAIMED IS:

1                   1.       A method for use in a fixed point arithmetic processing device having  
2 an input vector that contains one or more vector elements, and is an M bit integer, and a  
3 maximum permitted left shift (MLS) value for the input vector is less than or equal to the  
4 value of M - 2, the method for scaling all the vector elements based on the vector element  
5 with the largest magnitude, the method comprising:

6                   sequentially searching each vector element to find a left shift value for scaling  
7 each vector element;

8                   comparing the left shift values to determine a minimum left shift (NLS\_MIN)  
9 for scaling the largest vector element;

10                  employing the NLS\_MIN value to determine whether the input vector is a  
11 non-zero input vector;

12                  if so, regardless of whether the largest element of non-zero input vector has a  
13 positive or negative magnitude, offsetting the NLS\_MIN value by the MLS value to obtain  
14 an actual number of left shifts (NLS) value for scaling the input vector;

15                  determining whether the input vector is a zero input vector; and

16                  if so, offsetting the NLS\_MIN value by the MLS value to obtain the NLS  
17 value.

18                   2.       The method of claim 1 further comprising employing a pdmsb  
19 instruction for sequentially searching, and for comparing said left shift values.

20                   3.       A method, by a processing device, for scaling an M-bit integer input  
21 vector containing one or more vector elements, said method comprising:

22                   receiving a maximum permitted left shift (MLS) value for the input vector,  
23 said MLS value being less than or equal to M - 2;

24                   determining a minimum left shift (NLS\_MIN) for scaling said vector element  
25 with the largest magnitude;

26                   employing said NLS\_MIN value to determine whether said input vector is a  
27 zero input vector, or a non-zero input vector irrespective of the positive or negative value of  
28 said non-zero input vector;

29                   if a non-zero input vector is determined, offsetting said NLS\_MIN value by  
30 said MLS value to obtain an actual number of left shifts (NLS) value for scaling said input  
31 vector; and  
32

13 if a zero input vector is determined, offsetting said NLS\_MIN value by said  
14 MLS value to obtain the NLS value.

1 4. The method of claim 3 wherein offsetting said NLS\_MIN value for  
2 said zero input vector further comprises said NLS value being given by:  $MLS + 1$ .

1 5. The method of claim 3 wherein offsetting said NLS\_MIN value for  
2 said non-zero input vector further comprises said NLS value given by:  $NLS = NLS\_MIN +$   
3  $(MLS - (M - 2))$ .

1 6. The method of claim 3 further comprising employing a pdmsb  
2 instruction for sequentially searching, and for comparing said left shift values.

1 7.. The method of claim 3 wherein employing said NLS\_MIN value  
2 further comprises determining whether  $NLS\_MIN = 31$ , if  $NLS\_MIN \neq 31$ , then the input  
3 vector is a non-zero input vector.

1 8. A processor operable from an M-bit instruction set where M is an  
2 integer, the processor comprising:

3 a memory unit for storing at least first instruction stream comprising M-bit  
4 instructions;

5 an execution unit operable to receive execution signals to execute the M-bit  
6 instructions;

7 a decode unit coupled to the memory unit and to the execution unit to receive  
8 and decode the first instruction stream from the memory unit to produce therefrom the  
9 execution signals, the execution signals for:

10 determining a minimum left shift (NLS\_MIN) for scaling said vector element  
11 with the largest magnitude;

12 employing said NLS\_MIN value to determine whether said input vector is a  
13 zero input vector, or a non-zero input vector by evaluating if  $NLS\_MIN = 31$ ;

14 if  $NLS\_MIN \neq 31$ , then the input vector is a non-zero input vector; and

15 determining an actual number of left shifts (NLS) for scaling the non-zero  
16 input vector.

